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(54) **ELECTRONIC-INK BASED DISPLAY TAGGING SYSTEM EMPLOYING A PLURALITY ELECTRONIC-INK DISPLAY TAGS HAVING A STACKED ARCHITECTURE AND BEING POWERED AND PROGRAMMED BY A PORTABLE TAG ACTIVATION MODULE**

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Related U.S. Application Data

(63) Continuation of application No. 11/196,776, filed on Aug. 2, 2005, now abandoned, which is a continuation of application No. 09/393,553, filed on Sep. 10, 1999, now Pat. No. 6,924,781.

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(51) **Int. Cl.**
G06K 7/08 (2006.01)

(52) **U.S. Cl.** **235/451**; 235/383; 235/375; 235/492; 235/385; 340/5.91

(58) **Field of Classification Search** 235/451, 235/383, 375, 492, 385; 340/5.91
See application file for complete search history.

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(57) **ABSTRACT**

An electronic-ink based display tagging system including a plurality of programmable electronic-ink display tags, and a portable tag activation module for programming display indicia to be displayed on each electronic-ink display tag. Each electronic-ink display tag includes an addressable display assembly including a layer of electronic ink including a bi-stable non-volatile imaging material. Each electronic-ink display tag includes an antenna structure for receiving radio-frequency (RF) power signals transmitted by the portable tag activation module, and (ii) sending and/or receiving electromagnetic signals carrying information corresponding to one of instructions, programs, data or graphical indicia to be displayed by the addressable display assembly. Each electronic-ink display tag also includes an integrated circuit structure having a storage element for storing instructions, programs and data, and a programmed processor in electrical communication with the addressable display assembly. A signal transmitting structure transmits signals from the antenna structure, to the portable tag activation module, whereas a signal receiving structure receives electromagnetic signals from the portable tag activation module, using the antenna structure. A power converter converts received RF-power signals into electrical power signals and stores electrical charge for powering the integrated circuit structure, including the programmed processor, to process instructions and data to (i) determine the graphical indicia to be displayed by the addressable display assembly and (ii) activate the addressable display assembly to display determined graphical indicia.

37 Claims, 7 Drawing Sheets